

PART-III : MATHEMATICS

SECTION – 1 (Maximum marks : 24)

- This section contains **EIGHT (08)** questions.
- The answer to each question is a **NUMERICAL VALUE**.
- For each question, enter the correct numerical value of the answer using the mouse and the on-screen virtual numeric keypad in the place designated to enter the answer. If the numerical value has more than two decimal places, **truncate/round-off** the value to **TWO** decimal places.
- Answer to each question will be evaluated according to the following marking scheme:

Full Marks : +3 **ONLY** if the correct numerical value is entered;

Zero Marks : 0 In all other cases.

1. Considering only the principal values of the inverse trigonometric functions, the value of

$$\frac{3}{2} \cos^{-1} \sqrt{\frac{2}{2+\pi^2}} + \frac{1}{4} \sin^{-1} \frac{2\sqrt{2}\pi}{2+\pi^2} + \tan^{-1} \frac{\sqrt{2}}{\pi}$$

is _____.

Answer (= 2.36)

Sol.
$$\begin{aligned} & \frac{3}{2} \tan^{-1} \frac{\pi}{\sqrt{2}} + \frac{1}{4} \tan^{-1} \left(\frac{2\sqrt{2}\pi}{\pi^2 - 2} \right) + \tan^{-1} \frac{\sqrt{2}}{\pi} \\ &= \frac{\pi}{2} + \frac{1}{2} \tan^{-1} \frac{\pi}{\sqrt{2}} - \frac{1}{4} \tan^{-1} \left(\frac{2\sqrt{2}\pi}{2 - \pi^2} \right) \\ &= \frac{\pi}{2} + \frac{1}{2} \tan^{-1} \left(\frac{\pi}{\sqrt{2}} \right) - \frac{1}{4} \tan^{-1} \left(\frac{2 \cdot \left(\frac{\pi}{\sqrt{2}} \right)}{1 - \left(\frac{\pi}{\sqrt{2}} \right)^2} \right) \\ &= \frac{\pi}{2} + \frac{1}{2} \tan^{-1} \left(\frac{\pi}{\sqrt{2}} \right) - \frac{1}{4} \left(-\pi + 2 \tan^{-1} \left(\frac{\pi}{\sqrt{2}} \right) \right) \\ &= \frac{\pi}{2} + \frac{\pi}{4} = \frac{3\pi}{4} \\ &= 2.36 \end{aligned}$$

Maths Paper 1

Rosina Ehmann



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